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ABSTRACT

This study investigated the association between college students' engagement of learning strategies and their academic performance in a freshman psychology course. Three groups of students participated in the study: 22 at-risk freshmen who were taught learning strategies in a linked strategy-instruction course; 22 students who had previously taken a remedial reading course; and 184 regularly admitted freshmen and upper level students. The linked learning strategies course was an intensive introduction to studying in college, and students were taught to monitor reading comprehension using annotated marginal study questions. All three groups of students completed the Student Activity Questionnaire (SAQ) at the end of the psychology course. Data were analyzed to correlate and compare students' grades in the psychology course with SAQ scales that measured levels of cognitive processing, representation, memory augmentation, effort management, initiative, and efficacy. The at-risk students who received strategy instruction earned grades similar to the regularly admitted students. For all students, grades in the psychology course had a high positive correlation with levels of self-efficacy for academic learning in college; for the linked and regularly admitted students, grades in the course had a high positive correlation with levels of cognitive processing and effort management. Three data tables are appended. (Contains 23 references.) (CH)

running head: COLLEGE STUDENTS' STRATEGY ENGAGEMENT

College Students' Academic Performance: The Interaction of Strategy Engagement, Content, and Context

A ROUNDTABLE PRESENTATION

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Abstract

This research, conducted at a large southeastern regional university in the United States, investigated the association between students' engagement of learning strategies and their academic performance in a freshman psychology course. Three groups of student participants were: (a) 22 current freshmen "at-risk" students who were taught learning strategies in a linked strategy-instruction course; (b) 22 former "at-risk" students who had previously exited the traditional remedial reading program at the university; and (c) 184 regularly-admitted students – both freshmen and upper level students. Data were analyzed to correlate and compare students' grades in the psychology course and responses on the Student Activity Questionnaire (SAQ). The "at-risk" students who received strategy instruction earned grades similar to the regularly-admitted students in the psychology course. For all students in the psychology course, grades in the course had a high positive, significant correlation with levels of self-efficacy for academic learning in college. For the Linked and regularly-admitted students, grades in the course had a high, positive correlation with levels of cognitive processing and effort management.

College Students' Academic Performance: The Interaction of Strategy Engagement, Content, and Context

Theoretical implications for understanding the relationships among instruction, self-regulation, and transfer have been associated with numerous exemplary strategy-training interventions and models (Borkowski, 1992; Butler, 1998; Ellis, 1993; Harris & Graham, 1996; Pressley, Schuder, Bergman, & El-Dinary, 1992; Zimmerman, 1998). Extensive research indicates that strategy instruction should be embedded as much as possible into the (meaningful) content of a transfer course ((Brown, Collins, & Duguid, 1989; Hattie, Biggs, & Purdie, 1996). In these transfer contexts, students should feel a sense of ownership of the strategies they use (Butler, 1994, 1995, 1998). Other findings indicate that self-efficacy and positive attributional beliefs result when students are cognizant of the relationships among effort, strategic activities, and task performance (Borkowski, Weyhing, & Turner, 1986). Thus, effective strategy transfer instruction should include metacognitive awareness training which involves instruction not only in how to perform a particular strategy but when, where, and why to use that strategy (Brown, Campione, & Day, 1981; Dansereau, 1985; Paris, Lipson, & Wixson, 1983). Students acquire metacognitive acuity when they are enabled to abstract general principles from their experience with particular strategies and to generalize that knowledge to new situations (Pressley & Ghatala, 1990; Salomon & Perkins, 1989; Wong, 1994).

In response to the academic needs of students identified as at-risk for graduating, institutions of higher education in the United States have created courses designed to teach students a variety of learning and motivational strategies for directing and controlling their personal learning experiences. Linking a learning strategy course with a content area course is an instructional delivery model which has been shown to be an effective approach to directly assisting at-risk students and for teaching multiple transferable learning strategies within content-specific settings (Dimon, 1988; Keimig, 1983; Stallworth-Clark, Nolen, Warkentin, & Scott, 1999; Stratton, Commander, Callahan, & Smith, 1996).

Purpose

The purpose of the present research was two-fold: (a) to investigate the relationship between students' engagement of learning strategies and their academic performance in a large (n = 200) auditorium freshman course, Introduction to Psychology (PSYC 1101), and (b) to determine the effectiveness of linking a strategy training course for at-risk students with a content course in college. Knowledge of students' use of learning strategies and the effectiveness of the linked instruction model was considered to be important to the expanded mission of university services for at-risk students.

Method

Participants

Two hundred ninety-three students were enrolled in PSYC 1101. Two hundred twenty-eight of these students consented to participate in the investigation. Among these 228, there were 22 "at-risk" freshmen who were also enrolled in a learning strategy (LS) course which was linked to the psychology course, 22 students (primarily sophomores) who had at one time prior taken a remedial reading course at the university, and 184 regularly-admitted students (primarily freshmen and sophomores). At-risk students at this university are provisionally-admitted with lower SAT verbal scores and high school grade point averages. Administrative approvals, scheduling, recruiting, student consents, and collaboration issues were successfully resolved prior to the beginning of the course.

Procedures

The instructor of the learning strategies (LS) course attended the Introduction to Psychology class meetings with the students to informally gain understanding of the psychology learning context. The 22 current "at-risk" students met with the LS instructor twice weekly for two-hour sessions of direct instruction in learning strategies embedded within the on-going context of the psychology course. Participating students completed the Student Activity Questionnaire (SAQ) at the end of the psychology course.

The Linked Learning Strategies Course (LS). The course, Academic Reading 099A, was an intensive introduction to studying in college. Students were taught to learn from their textbook by monitoring their reading comprehension using the annotated marginal study questions provided by the psychology professor. Other study activities included participation in cooperative learning groups where students collaborated to map major concepts, identify key concepts in marginal study questions, mark explanatory text materials for review, and to create concept lists for review prior to weekly psychology exams. Students were continually encouraged to regulate their own study activities for the psychology course by using the strategies which were demonstrated and modeled by the LS instructor. Also, at each LS class meeting, the instructor tested the students' knowledge of the current psychology readings with a multiple choice test which was similar in format to the psychology professor's weekly tests. Reading assignments in the LS class were paced so as to assist the students in avoiding cramming and marathon study sessions for the weekly Psychology 1101 tests.

The Psychology Course. The course, Introduction to Psychology 1101, was an in-depth introduction to selected topics in psychology taught in a large theater classroom. Single disciplinary topics were explored in-depth each week. The class met three times weekly for one hour each meeting. Two class sessions per week were devoted to short introductions to psychology topics and video presentations; one day weekly were devoted to a chapter quiz (20 items multiple-choice). The professor-created textbook for the course included marginal study

questions for the weekly quizzes which students were encouraged to use as a study guide. Fourteen 100 point quizzes and a 100 point comprised the possible 1500 total point course. Extra credit points (100 points) could be earned through pop quizzes and postings to a course web page. Students were expected to read and to study approximately 50 text pages per week.

The psychology professor described the course as a survey of traditional topic areas within psychology. Topics included, among others: states of consciousness, conditioning, cognition, motivation, personality theories, abnormal, and social psychology. Chapters were arranged in manageable segments in narrative structure with explanatory graphics and selected term definitions included within the text. The professor explained that in a real sense, the subject matter for psychology is "you" or "all of us," and that his objective was for students to learn to identify typical patterns of human thought in order to achieve a deeper understanding of human behavior. His hope was that students would leave his class as adaptive thinkers with "nuggets" of knowledge which could possibly remain with them throughout life. Lectures were essentially non-existent. Video presentations were used to supplement and to enhance the course content.

The professor's approach to instruction was based on the Personalized System of Instruction (PSI), or Keller Plan (Keller, 1968), a "Mastery Learning " system in which all instructional content is presented in writing. Students could predict the type and style of exams which followed the same format weekly. PSI involves a modular approach, and students are encouraged to master each module even if it takes repeated attempts on equivalent form tests. In the present psychology course, learning modules were presented as chapters where all information was presented in written form in the textbook with test questions annotated in the text margins. Students were allowed to re-take selected weekly chapter quizzes at the end of the term in order to overcome poor performance scores on weekly quizzes.

The Student Activity Questionnaire. Participating students completed the Student Activity Questionnaire(Warkentin, 1991) at the end of the psychology course. The SAQ is based on the Rasch measurement model (Warkentin & Thomas, 1990; Wright & Masters, 1982), a theoretical approach to constructing items based on increasing degrees of proficiency in cognitive and effort management study activities (Thomas & Rohwer, 1993). The foundational Rasch hypothesis is that students respond in patterns which indicate their level of endorsement for a particular learning strategy, from little to mid-level to high involvement. Higher scores on the items indicate more proficiency in the learning strategy. Students vary along individual item variables. Scores at the highest level are rare. Statistics give information about how well items are responded to. The Rasch model starts with the prediction of order of endorsement from weak to high and assesses students behaviors in four different study contexts, namely: (a) while reading assignments for the first time; (b) during a typical class session; (c) when managing their time and effort; and (d) when preparing for tests (Thomas, Bol, Warkentin, Wilson, Strange, & Rohwer, 1993).

Student scores on the SAQ scales range from negative numbers (mean = zero) to 3.00. The lower scores represent a low level of participation in the specific studying activity, and the higher scores represent a higher level of participation in the specific studying activity. Likert

items range in values from zero "not at all like me" to 3 Very much like me." Six scales in four study contexts are designed to measure levels of the following study activities: (a) cognitive processing; (b) representation; (c) memory augmentation; (d) effort management; (e) initiative; and (f) efficacy.

(1) Levels of cognitive processing. Cognitive processing levels assess dimensions of cognitive processing. Dimensions are defined as four principal levels: Basic Encoding, Selection, Integration, and Extension activities. Each level defines a dimension of increasing generative and transformational processing. Each lower-level activity is foundational to the next higher-level activity and is incorporated into that higher level activity. Basic encoding activities are the initial basis of knowledge comprehension, selection activities are more generative in that they use the cognitive products produced by encoding to distinguish relevant or main ideas. The cognitive products resulting from selection activities are operated upon by integration activities which requires more generative processing. Finally, the products resulting from integrative processing are incorporated and extended at the next level of extension activities. Proficiency in self-directed studying is defined in terms of more engagement in a greater range of the generative activities. That is, higher scores on this scale indicate higher-levels of engagement in generative transformational processing during studying.

(2) Levels of representation. Representation levels assess the kind of information students concentrate on while engaged in the four principal processing levels. Within each of the four principal levels of processing, students may concentrate on lower-level propositions, middle-level propositions, or higher-level propositions. Higher scores on this scale indicate more focus on higher-level propositions while studying. The students' total score in the scale represents the extent to which they focused on the higher-level propositions within each of the cognitive processing activities and study contexts.

(3) Levels of memory augmentation. Memory augmentation levels assess the degree to which students employ memory enhancement strategies. The activities form a continuum of increasing constructive memory augmentation. The scale ranges from no augmentation activities, duplicative rehearsal (e.g., repeating words over and over), interpretative activities (e.g., paraphrasing), to constructive activities (e.g., making an image, diagram, chart). Higher scores on this scale indicate employment of more constructive memory activities.

(4) Levels of effort management. Effort management levels assess students' metacognitive and self-regulatory activities. Four principal levels are proposed: Monitoring, Self-regulating, Planning and Evaluating. These levels are organized along a continuum of increasing self-knowledge ranging from awareness of study activities to control over study activities. Self-knowledge involves the connection between effort and achievement, the value of strategic activity, and the sources of effort interference. According to this conception, self-directed students monitor the level of their concentration, comprehension, memory, and awareness of factors related to effortful learning; they regulate and remediate their own learning efforts; they

engage in planning activities to guide their efforts productively; and they engage in evaluating activities such as reflecting upon the effectiveness of strategies.

(5) Levels of initiative. Initiative levels specify the source for engaging in self-management and cognitive activities. Levels range from receptive initiative (e.g., following explicit external directives), reactive initiative (e.g., responding to external cues or hints), to proactive initiative (e.g., perceiving oneself as the agent and internal source). Higher scores on this scale indicate greater awareness and control over one's learning and management activities.

(6) Levels of efficacy. Efficacy levels indicate the confidence for achieving in a college learning context. Higher scores on this scale indicate greater confidence and sense of competence in one's learning capacities.

Data Analysis

Descriptive statistics, t-tests, correlation, chi-square analysis, and tests for analysis of variance (ANOVAs) were used to compare three student groups on study strategy engagement and academic performance in the psychology course; specifically, performance comparisons focused upon total points earned in the course. Correlation analyses examined relationships of students' self-reported engagement of learning strategies and their academic performance. Independent samples chi-square tests were used to compare the linked students with the other students in the psychology course on numbers of grades (As, Bs, Cs, Ds, Fs) earned.

Results

Grades in the psychology course were determined by total points earned on the weekly quizzes, final, and extra credit activities as noted. Three group chi-square analysis indicated that the distribution of course grades were not significantly different across groups.

Means of standard Rasch scores and comparisons for the three student groups on the SAQ indicate that students differed on levels of representation. Regularly-admitted students scored highest (m = 1.28); Linked students (m = .79); and Former at-risk students scored lowest (m = .18). SAQ means were similar for the student groups on all other dimensions. However, there were differences among the student groups on SAQ mean correlations with total points earned in PSYC 1101.

Pearson correlation coefficients for students on SAQ dimensions and total points earned in PSYC 1101 indicate significant correlations for Linked and Regularly-admitted students on levels of cognitive processing and effort management. Efficacy was significantly correlated with course performance for all three student groups. Although representation levels differed among groups, representation levels did not correlate highly with the PSYC 1101 grades of the students.

Discussion

PSYC 1101 was obviously a challenge for many students in the class. This was a difficult first semester for the entering freshmen and the first term on a change-over to semester system for the university. The Former at-risk students' performance was of particular interest to the researchers because these students had not taken a linked learning strategies course, and the effectiveness of the Linked course was at issue. However, Former at-risk students had already earned an average number of 29 hours (sophomore level) when they took PSYC 1101; thus, these students were more experienced than the first-term, linked LS students and other entering freshmen in the class. The Former at-risk students had persisted through the freshman year.

Self-efficacy and systematic studying contributed to higher grades in the psychology course. According to students' SAQ mean scores, the more systematic their study attempts (cognitive processes), the higher their grades in PSYC 1101. The Former at-risk students also had higher levels of efficacy for learning in the class than the Linked students. In this study, across all student groups, self-efficacy was important. That is, those with higher efficacy did better, and those with lower efficacy did poorer. Surely it is important that students expect to succeed. Those students who expected to succeed did well.

Memory augmentation (implementation of constructive activities) may not have been important in PSYC 1101. However, effort management appeared to be a strong and necessary motivational strategy. Students were required to manage themselves and to sustain their concentration for learning. In this context, the linked students' learning activities were highly structured by the LS instructor.

For all students, the significant correlations of efficacy with total points earned in PSYC 1101 is gratifying to see. Among other SAQ levels, in general, there were not enough differences to show means except on representation. It is evident that the higher the level of cognitive processing as measured on the SAQ, the better the student did in the course.

If we can assume that the Regularly-admitted students had higher admissions criteria initially, the Linked students' significant correlations on SAQ dimensions with cognitive processing and effort management may be an indication that the study strategies taught in the LS class and the supervised management of study efforts were transferred to the psychology course setting. Interestingly, the pattern of significance is the same for the Linked and Regularly-admitted students. This indicates that the Linked students demonstrated behaviors similar to those of the higher credentialed students. This could be the result of the LS instructor's attendance in the psychology classes and this instructor's facilitation of learning behaviors which are needful in the class in order to succeed.

It is important to remember that the Linked at-risk students were provisionally-admitted entering freshmen with statistically lower Scholastic Achievement Test (SAT) verbal scores than the Regularly-admitted students and no prior experience in college. The SAT verbal test assesses

students' current level of reading comprehension and verbal inferential reasoning of college-level material (vocabulary, verbal knowledge base, and use of reading strategies). The implication of a low SAT verbal score is that the student has a low predicted probability of success in college reading-intensive courses such as the social science course, PSYC 1101. However, in this study, the results show that the Linked students succeeded in PSYC 1101 at a rate similar to Regularly-admitted students who were predicted to succeed. It appears that the Linked students who were using study strategies tailored to psychology were effective in PSYC 1101. It is reasonable to conclude that the Linked course approach for at-risk students can contribute to substantial support for their academic performance in college.

Table 1.

Grades Earned in Introduction to Psychology 1101

	A	B	C	D	F
Linked Students	3 (14%)	4 (18%)	5 (23%)	5 (23%)	5 23%)
Prior At-Risk	2 (9%)	2 (9%)	11 (50%)	3 (14%)	4 (18%)
Regularly-Admitted	28 (15%)	55 (30%)	45 (24%)	21 (11%)	35 (19%)

Note: The distribution of course grades were not significantly different across student groups ($\chi^2 = 11.47$, $df = 8$).

Table 2.

Means of Standard Rasch Scores and Comparisons for Three Student Groups on the Study Activity Questionnaire (SAQ), Prior Cummulative Hours Earned and Total Points Earned in Introduction to Psychology 1101.

	Linked Students		Former At-Risk Admitted Students		Regularly-Admitted Students		F-Ratios
Variables	n	M	n	M	n	M	
Cog. Proc.	17	-0.21	15	0.27	123	0.19	0.90
Represen.	15	0.79	15	0.18	117	1.28	5.13**
Initiative	12	2.32	12	1.44	86	1.86	2.02
Mem Aug	11	0.02	12	-0.02	89	0.17	0.14
Effort Man	11	-0.26	15	0.24	123	-0.05	2.09
Efficacy	16	-0.90	13	-0.33	113	0.08	2.08
Cum Hrs	22	0	22	29	184	16	
Total Points	22	932	22	960	184	974	0.30

Note: Total possible points in Psychology 1101 equaled 1500.

** $p < .01$

Table 3.

Pearson Correlation Coefficients for Students on SAQ Scales and Total Points Earned in PSYC 1101

SAQ Scale	Total Points Earned in PSYC 1101		
	Linked Students n = 17	F- At-Risk Students n = 15	Reg-Admit Students n = 123
Cognitive Processes			
Cognitive Processing	.67**	.49	.18*
Representation	.16	.20	.15
Initiative	.20	.19	.18
Memory Augmentation	.41	.04	.03
Metacognitive/Motivational Processes			
Effort Management	.65***	.35	.23*
Efficacy	.79***	.64*	.48***

* $p < .05$

*** $p < .001$

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